



DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600



DDESB-KT

18 APR 1997

MEMORANDUM FOR DDESB BOARD MEMBERS AND ALTERNATES

SUBJECT: Munitions Suitable for Storage in ARMCO Revetments for Flight Line Operations

REFERENCES: (a) Minutes of 314 DDESB Board Meeting, Attachment F (4 Feb 1997)

(b) Letter, Michael Swisdak (NSWC) to Ray Sawyer (DDESB-KT),
"Proposed ARMCO Revetment List," (17 Mar 1997)

Criteria were approved during the 314th DDESB Meeting (Reference (a)) for siting of munitions in ARMCO revetments during flight line, "load and unload operations." The DDESB Secretariat received an action item from the Board to develop and maintain a list of munitions suitable for storage in ARMCO revetments. Personnel from the Air Force and the Army prepared Reference (b) to support the assigned action. Reference (b) contains both a current listing of munitions suitable for use with an ARMCO revetment and a proposed methodology for adding other munitions to the list in the future.

At present, only those munitions common to the Air Force for flight line operations are listed. Operations in which the ARMCO Revetments would find applications for the other Services have not decided. However, if operations other than those on a flight line are approved, a methodology for screening new munitions will permit new munitions, common to all Services to be added in the future.

Attachment A contains the present listing of approved munitions while Attachment B contains the munitions screening procedure.

My POC for this action is Dr. Chester E. Canada (PH: 703-325-1369; FAX: 703-325-6227; E-Mail: canadac@ix.netcom.com).

W. RICHARD WRIGHT
Colonel, USA
Chairman

Attach
As stated

AO
KO
KT
KA
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KAF
IKs Review

4/17

970416 Doc

(3) - Canada

MUNITIONS APPROVED FOR STORAGE IN ARMCO REVETMENTS DURING FLIGHT LINE OPERATIONS

(16 April 1997)

HAZARD DIVISION	NOMENCLATURE	IDENTIFIER	REFERENCE
1.6	Any Item		1, 2
1.4*	Any Item		1, 2
1.3*	Any Item		1, 2
1.2 (unit risk)	Any Item		1, 2
1.2	Any Item		1, 2
1.1	Bomb, General Purpose	MK 81	3, 4, 5
	Bomb, General Purpose	MK 82	3, 4, 5
	Bomb, General Purpose	MK 83	3, 4, 5
	Bomb, General Purpose	MK 84	3, 4, 5
	Bomb, General Purpose	M117	3, 4, 5
	Bomb, General Purpose	M118	3, 4, 5
	Bomb, General Purpose	T56	3, 4, 5
	Bomb, General Purpose	BLU-31	3, 4, 5
	Bomb	BLU-82	6
	Bomb	BLU-109	6
	Guided Bomb	BLU-110	6
	Guided Bomb	BLU-1119	6
	Bomb	BLU-113	6
	Bomb, Fragmentation	AN-M41A1	3, 4, 5
	Bomb, Semi Armor Piercing	AN-M59A1	3, 4, 5
	Dispenser and Bomb	CBU-20	10
	Dispenser and Bomb	CBU-38	10
	Dispenser and Bomb	CBU-59	10
	Dispenser and Bomb	CBU-70	10
	Dispenser and Bomb	CBU-87	10
	Dispenser and Bomb	CBU-89	10
	Guided Missile	AGM-45 (SHRIKE)	9
	Guided Missile	AGM-65 (MAVERICK)	6
	Guided Missile	AGM-84 (HARPOON)	6
	Guided Missile	AGM-86 (ALCM)	6
	Guided Missile	AGM-109 (TOMAHAWK)	6
	Guided Missile	AGM-119 (PENGUIN)	6
	Guided Missile	AGM-122 (SIDEARM)	9
	Guided Missile	AGM-123 (SKIPPER)	6
	Guided Missile	GM-142 (HAVE NAP/POPEY)	6
	Guided Missile	AIM-7 (SPARROW)	7, 8
	Guided Missile	AIM-9 (SIDEWINDER)	9
	Guided Missile	AIM-54 (PHOENIX)	9
	Torpedo	MK 48	7, 8
	Torpedo	MK 48 ADCAP	7, 8
	Torpedo	MK 46	7, 8
	Projectile	M107 155 mm, HE	6
	Projectile	M106, 8 inch, HE	6
1.1/1.2*	Guided Missile	AGM-88 (HARM)	9
	Guided Missile	AIM-120 (AMRAAM)	9
	Projectile	M1, 105 mm, HE	6

* Hazard Classification depends on packaging configuration

REFERENCES

MUNITIONS APPROVED FOR STORAGE IN ARMCO REVETMENTS DURING FLIGHT LINE OPERATIONS (16 April 1997)

1. DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards, October 1992, latest version,
2. Minutes of 314th Board Meeting, Attachment F, 4 Feb. 1997
3. Peterson, F. H., "High Explosive Test (Big Papa)", AFWL-TR-67-132, May 1968
4. McGuire, R. C., "Safe Parking Distances For Heavy Bomber Aircraft In Revetments (Project BIG MOMMA)", AFATL-TR-66-102, 1966.
5. Jorgensen J M., "Aircraft Shelter Explosives Quantity-Distance Evaluation Concrete Sky Phase IXB, AFWL-TR-71-65, July 1971.
6. *Analysis by M Swisdak, based on definition of robust/non robust munitions and analogy with references 3,4,5.
7. Reeves, H., "Magazine Crush Tests Results for Thin-Skinned Ordnance Items," EMRTC Report 0- FR-94-34, Energetic Materials Research and Testing Center, New Mexico Tech, Socorro, New Mexico, 15 December 1994,
8. Hager, K., Tancreto, J E., and Swisdak, M., "Analysis Of ARMCO Revetments To Prevent Sympathetic Detonation of Thin Case Munitions," NFESC TR-2059-SHR, May 1996.
9. Tancreto, 3., Swisdak, M., and Malvar, J., "High Performance Magazine Acceptor Threshold Criteria," Minutes of the 26th DoD Explosives Safety Seminar, 16- 18 Aug., 1994.
10. Analysis by M. Swisdak and analogy with CBU-7, CBU-12, CBU-14, CBU-22, CBU-24, CBU-46, CBU-49, CBU-52, and CBU-58.
11. Definition of Robust Munitions from DoD 6055.9-STD: These are munitions having a ratio of the explosive weight to the empty case weight less than 1.00 and a nominal wall thickness of 0.4 inches. Examples of robust ammunition include MK 80 series bombs M107 projectiles, Tomahawk and Harpoon penetration warheads and 20, 25, and 30 mm cartridges. Examples of non-robust ammunition include CBUs, torpedo warheads, underwater mines and TOW, HELLFIRE, Sparrow, and Sidewinder Missiles. Unless otherwise noted, all air-to-air missile warheads are defined as non-robust.

**PROCEDURE FOR PLACING AN ITEM ON THE ARMCO
REKETMENT APPROVED MUNITIONS LIST
FOR FLIGHT LINE OPERATIONS**

The typical procedure for adding munitions to the ARMCO Revetment, Approved Munitions List for flight line operations is outlined below.

- Submit an approval request with the following information to the Chairman, DDESB:
 - Configuration drawings showing case and explosives materials dimensions
 - General information about the explosives fill (materials; weights; sensitivities; the casing (materials; weights; nominal dimensions; etc.); and the all-up item (nomenclature, sensitivity test data, etc.)
 - Hazard classification test data for single package, stack, and external fire tests
 - Information about other items that are pertinent to the item in question
- Addition of an item to the Approved List is warranted if either of the following is true:
 - the item under consideration is considered equivalent to one already on the list; or
 - analyses, conducted IAW Reference (1), indicate that the item will not promptly detonate; or
 - experimental results, taken IAW Reference (2), indicate that the item will not promptly detonate

References:

1. Hager, K., Tancreto, J. E., and Swisdak, M., "Analysis of ARMCO Revetments to Prevent Sympathetic Detonation of Thin Case Munitions," NFESC TR-2059-SHR (May 1996)
2. Tancreto, J., Swisdak, M., and Malvar, J., "High Performance Magazine Acceptor Threshold Criteria," Minutes of the 26th DoD Explosives Safety Seminar (16-18 Aug 1994)